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Economic Effects of Increased Ethanol Use in Montana

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The use of ethanol blend fuel is increasing in Western states and in the U.S. as a whole. Reasons for this include federal and state-level incentives, the improved economics of ethanol production, and the increasing number of states enacting restrictions on methyl tertiary butyl ether (MTBE) and other additives that increase gasoline octane. This paper describes possible economic effects of increased use of fuel ethanol in Montana's gasoline markets. The economic effects are described in this paper for four categories: 1. Effects on the gasoline consumer, 2. Effects on gasoline refining and retail operations, 3. Effects of an in-state ethanol production plant on local economies and farmers; and 4. Effects of indirect benefits to Montana from increased ethanol fuel usage.

Current Ethanol and Gasoline Consumption and Production in Montana

Ethanol blended gasoline currently makes up a small percentage of the total gasoline consumed in Montana. The greatest volume of ethanol blend used in Montana is E-8, an 8 percent ethanol blend in regular gasoline, required in Missoula during the winter months to protect air quality. Missoula accounted for approximately 11 million gallons of the almost 18 million gallons of total ethanol blend gasoline sold in Montana in fiscal year (FY) 2003. The most common blend used year-round in Montana is E-10, which is a 10 percent ethanol blend. At the present time, December 2004, E-10 is available at approximately 50 gas stations across Montana. E-85 is a generic term for gasoline blends containing up to 85 percent fuel ethanol. Like gasoline, E-85 comes in a summer and winter blend, with the winter blend containing about 70 percent ethanol to allow the fuel to vaporize in cold conditions. E85 is available to the public at two gas stations in Montana[1]. It is used by private fleets in Gardiner, Montana.

Ethanol is not currently produced in Montana. Ethanol sold in Montana is imported into the state and splash blended with gasoline at distribution bulk terminals. Montana's four refineries provide almost all of the gasoline consumed in Montana. Around 55 percent of the liquid fuel produced at these four refineries is exported[2]. About half of product exports flow south out of Montana to Wyoming, Colorado and beyond. The other half flows to Washington and North Dakota. Gasoline exported from Montana refineries does not contain ethanol. Typically, ethanol is added to gasoline in the destination state that receives it at normal distribution points.

[1] "Hydrogen, Wind, Biodiesel, and Ethanol…Alternative Energy Sources to Fuel Montana's Future?", EQC Study Report, Sept. 2004.
[2] "Understanding Energy in Montana", DEQ Report for the EQC, Oct. 2004.

Ethanol blend gasoline makes up a small percent of today's total market share in Montana. The 17.6 million gallons of ethanol-blended gasoline sold in FY2003 (an estimated 3 million gallons of fuel ethanol) accounted for less than 4 percent of the 500 million or so gallons of gasoline sold in Montana[3]. Ethanol blends have never penetrated more than 5 percent of Montana's total gasoline market[4].

By comparison, over 30 percent of the nation's gasoline is blended with ethanol, largely due to air quality requirements[5]. In neighboring North Dakota, ethanol-blend use increased by 150 percent between 2001 and 2003, a change in total market share from 12 percent in January 2001 to 29 percent in January 2003. In 2003, ethanol-blended gasoline had a 49 percent market share in South Dakota produced by 7 operating ethanol plants[6]. A primary reason that there is so much ethanol production in the Dakotas is that ethanol plants provides an excellent market for surplus corn grown in those states. Also, North Dakota launched a large consumer education campaign to promote ethanol.

Effect of Increased Ethanol Consumption on Montana Gasoline Consumers.

This section discusses the economic effects on gasoline consumers that would occur if a significant percentage of gasoline sold in Montana contained fuel ethanol. Before estimating these effects, we first estimate the amount of total ethanol that could plausibly be consumed in Montana.

The amount of highway gasoline used in Montana in 2002, the most recent year of available data, was 476 million gallons plus 33 million gallons of non-highway (off-road) use[7]. A conservative estimate for the next 10 years would be 500 million gallons for average annual Montana gasoline consumption. Assuming in the future that all Montana gasoline consumed in the state contains an average 10 percent ethanol blend, then 50 million gallons of fuel ethanol would be needed annually in Montana. It is more likely in the near future that not all gasoline in Montana will contain ethanol. An average 10 percent ethanol blend in 20 percent of Montana's total gas market would require 10 million gallons of fuel ethanol in Montana annually, and E-10 in 50 percent of the Montana's total gasoline market would require 25 million gallons of fuel ethanol annually. This plausible 10-25 million gallon range for annual ethanol consumption in the foreseeable future is far greater than the 3 million gallons of ethanol consumed annually today. This estimated range would be expected to rise over time with increasing gasoline consumption, increasing market penetration of ethanol, increasing gasoline blends higher in ethanol than 10 percent (e.g. 50-85 percent ethanol blends or E-85), and increasing consumer education about the benefits of ethanol.

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[3] Montana Department of Transportation fuel tax records, FY2002 and FY2003, Bob Turner and "Understanding Energy in Montana", DEQ Report for the EQC, Oct. 2004..

[4] Montana Department of Revenue gasoline tax reports, 1980 through 1987.

[5] EPA Office of Transportation Air Quality, September 2004.

[6] Montana Petroleum Association State Level Ethanol Mandate White Paper (October 2004).

[7] "Understanding Energy in Montana", DEQ Report for the EQC, Oct. 2004, Table P11.

Montana gasoline consumers could potentially be affected by ethanol-blended gasoline if the price they pay at the pump changes[8]. Today, the retail price at the pump in Montana of ethanol-blended gasoline is generally the same as regular unleaded gasoline, even with its higher octane rating than regular grade. Thus, there is currently no direct economic impact on gasoline consumers today who buy ethanol blends. Gas stations compete fiercely on price, and will likely try to keep ethanol competitive with non-ethanol gasoline in the near future. Thus, gas customers should not see more than a few cents per gallon difference in either direction between ethanol and non-ethanol blends in the future. In other words, there should be little economic effect on gasoline customers from the increased penetration of ethanol into Montana's market. In comparison, a separate change in gasoline, the EPA mandate to lower sulfur gasoline in 2006-2007 and again in 2010, will create a 3 to 5 cent per gallon increase at the pump. Also, world oil prices have a far greater affect on gas prices than ethanol, as was seen in 2004.

A federal tax credit helps keep ethanol blend gasoline competitive, because the price of ethanol is currently greater than the price of gasoline. Currently, the rack terminal price for fuel ethanol in the U.S. generally ranges between $1.70 and $1.85 per gallon with most rack prices around $1.80 including Montana's. The rack terminal price varies currently by as much as $0.20 per gallon depending on the location of the terminal[9]. The average retail gasoline price in Montana today, minus about 45 cents per gallon in state and federal taxes, is around $1.45 per gallon. So, there is a difference of 35 cents per gallon comparing straight ethanol to gasoline. The amount of ethanol blended with gasoline, and the tax incentives provided need to be considered for a final comparison. For E-10, a 10% blend of ethanol, the price premium would be 3.5 cents (0.1 times 35 cents). This is offset by a federal tax credit on ethanol of about 4 cents per gallon making e-10 competitive with gasoline for the consumer.

In other parts of the nation, the use of ethanol has lowered the price of gasoline. During the summer of 2004, retail prices for ethanol blend gasoline in the Chicago and Milwaukee areas were less than their non-ethanol counterparts. In Atlanta, ethanol is expected to lead to lower gas prices at the pump in future years. One economist predicts that based on high gasoline prices in 2004, the use of ethanol in reformulated gasoline will reduce the cost of motor fuel and save money for drivers and consumers in the Atlanta metropolitan area by almost 6.5 cents per gallon. The reasons given include the fact that ethanol will increase the supply of reformulated gasoline to the Atlanta area (thereby lowering its price), and the Volumetric Ethanol Tax Credit signed into law by

[8] Montana gasoline consumers include just about everyone who drives in Montana or the vast majority of the adult population. Drivers of diesel vehicles are not included. The Clean Air Act Amendments require all cars sold in the US since 1978 to be able to use all legally blended oxygenated fuels, including a 10 percent blend of ethanol. Some off-road vehicles also use gasoline and may be able to use ethanol blend.
[9] Renewable Fuel News, Hart Energy Publishing, December 20, 2005, Vol. XVI, No. 50, page 11.

President Bush in October of 2004 at 51 cents per gallon[10].

Four factors in the future that will help keep ethanol blends price-competitive with non-ethanol blends include the continuing federal subsidy on ethanol which is set to expire in 2010, an ethanol plant operating in Montana (which would lower transportation costs of ethanol that currently must be imported), continuing technological development to improve ethanol production, and cost savings from economies of scale as more ethanol is produced.

Car performance should not be significantly affected by ethanol. Vehicle mileage could either decline or increase slightly from using ethanol-blended gasoline. The change would likely be insignificant. Thus, little economic effect is expected to Montana gasoline consumers if ethanol further penetrates Montana's market.

Effect on Montana Refineries and Gasoline Retailers

The refining industry in Montana would bear some costs from increasing ethanol usage in-state, but would likely not be significantly affected in the long run. For one, ethanol is an additive added after the refineries have produced their main gasoline product, so the main workings of the refinery would not be affected. Secondly, some of the gasoline distribution infrastructure already exists in Montana to handle the blending of ethanol for select or regulated markets, covering over 40% of the population. Ethanol delivery facilities already exist in Billings (for the Yellowstone market), Helena, Bozeman, various eastern Montana locations, and Missoula (for winter use)[11]. In addition, other states served by Montana refineries are already mixing ethanol with a large portion of their gasoline, and the refineries have adjusted to meet their changing specifications. Adjusting to ethanol is quickly becoming the cost of doing business in the refining industry. The CHS (CENEX) refinery in Montana already has two ethanol blending facilities at their bulk terminals in Montana located in Laurel and Glendive. The cost to install the injection system was $200,000. Storage tanks would be an additional cost and estimated at $1.00 per gallon to construct. [12]

Available evidence suggests that ethanol blend does not cost refineries any more to produce than other reformulated gas alternatives. In fact, it may cost less. The Renewable Fuels Association, a leading ethanol trade association headquartered in Washington DC, has released a study analyzing the refiner fuel costs during the transition from MTBE to ethanol. In every scenario examined, ethanol use reduced refiner costs compared to reformulated all-hydrocarbon gasoline. Reductions in refiner input costs ranged from 0.6-2.4 cents per gallon. The cost reductions were a result of the ethanol blend needing less hydrocarbons per

[10] "Impact of Ethanol on Consumers in Atlanta", John M. Urbanchuk, LECG LLC, November 10, 2004.
[11] Story Distributing, Conoco/Phillips Bulk Plant, Yellowstone Park Concessions Office, Montana Department of Transportation Fuel Tax Section records.
[12] Tom Harm, Cenex, cited in a personal email from Shirley Ball, EPAC, December 9, 2004.

gallon produced than the other alternatives[13]. Current subsidies on ethanol also played a role in lower costs. In California, ethanol blend gasoline refining costs have been 3 cents per gallon less on average than gas blended with MTBE[14]. It is unclear what the cost comparison would be in Montana, as Montana has already decreased the use of MTBE in its gasoline.

While refinery production costs might be less with ethanol blend gasoline, other costs including distribution could initially be more. With more ethanol consumed, refiners and pipeline terminals would be required to engineer, install and pay for delivery modifications to deliver ethanol, which would entail additional costs. Also, to meet vapor requirements, ethanol-blended gasoline in summer must be formulated with lower evaporative properties than gasoline that is to be sold for direct use[15]. This could add some cost as well. Retailers and distributors would need to change some of their procedures and educate their employees on how to handle the ethanol blend. Also, with greater market penetration, ethanol would be transported by rail car and tanker trucks to bulk terminals, which could cost more than using the pipelines which transport a majority of gasoline in Montana today. However, these costs do not appear to be prohibitive to the gasoline industry in other states. California, for example, banned MTBE in January 2004, and has been using ethanol ever since without supply disruptions or increases in cost greater than their other "boutique" fuel requirements (e.g. the recapture of refueling vapors, low benzene, etc.).

There could be another cost to Montana refiners from increased ethanol blend displacing in-state demand for the gasoline refined in Montana. Using the ethanol consumption estimates made in the previous section, up to five percent of Montana's total refined gasoline would be displaced with ethanol. The five percent displacement number assumes that 100 percent of Montana gasoline in the future contains a 10 percent blend of ethanol, with the additional understanding that less than half of what refineries produce is consumed in-state. By increasing their gasoline exports, refineries would likely make up that five percent or less displacement without much problem.

It appears that the costs to Montana's petroleum industry, including refineries and distributors, would not be any more prohibitive than those associated with meeting other standards that have occurred in past years. Past regulatory costs have been significant in the short-run to Montana's gasoline industry, but have not significantly hurt any of Montana's currently operating refineries.

Longer-term costs, if any, would likely be absorbed by refineries, or passed on to consumers in slightly higher gas prices. Refineries have had to absorb

[13] "Replacing the Volume & Octane Loss of Removing MTBE from Reformulated Gasoline: Ethanol Versus All Hydrocarbon RFG" prepared by Downstream Alternative. The RFA study was found in The Clean Fuels and Electric Vehicles Report, Energy Futures Inc., Vol 16, No. 3, September 2004.
[14] California Ethanol Workshop, presentation by California Air Resource Board, April 2003
[15] Montana Petroleum Association State Level Ethanol Mandate White Paper (October, 2004).

additional costs before for other changes in the industry, and have survived. About 50 retailers in Montana are already selling ethanol blends so it is clearly not cost prohibitive. Retailers in Missoula may actually see lower costs from selling ethanol blend year-round as they would not have to change to ethanol blend annually as they now do. Recent changes in EPA underground storage tank rules have ensured that all tanks can handle all legally blended oxygenated fuels, including E-10, so at least some additional retailer costs have already been incurred.

Economic Effects of Growing and Producing Ethanol in Montana on the local economy

An ethanol plant operating in Montana would create significant local economic benefits at the town and county level, plus some additional tax revenue at the state level. It would create benefits to farmers who provide the grains for such a plant. An ethanol plant and/or farmers growing ethanol feedstock would be well suited for Montana's economy. Montana already grows the crops for ethanol production--mainly corn, wheat and barley. The economic impacts from ethanol production in-state would benefit Montana's rural economy with secondary and supportive jobs and industry. Finally, ethanol attracts federal and state funds and credits to help development in that area. The effects on Montana's agricultural sector will be discussed in the next section.

An ethanol plant in Montana would create jobs, additional income and additional tax revenue in a rural economy that could use help. It would also be one of the few Montana industries that would produce and potentially export a value-added, finished product (as opposed to the many raw materials Montana produces), and would create positive secondary economic effects in state. Because of its value-added properties, ethanol would increase the economic value of Montana's agricultural sector, although the total percentage increase in value could be small. Ethanol is potentially a growth industry that could attract additional capital to the state, once the initial plants were built.

Currently ethanol is being produced in approximately 80 plants in 19 states. It is estimated that U.S. plants will produce about 3.3 billion gallons of ethanol in 2004. Growth is occurring quickly nationwide[16]. The average size of currently operating facilities is about 40 million gallons per year (MGY) of ethanol[17]. A large ethanol plant can produce 100 MGY. A 40 MGY plant would likely produce Montana's ethanol needs in the coming years plus a significant amount of exports. There will be a growing market for ethanol that could be produced in Montana and exported because of the rapid national growth.

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[16] "Ethanol Report 213", page 3, from the Renewable Fuels Association dated November 8th, 2004. This report is found on the Web at www.ethanolrfa.org/ereports/er110804.html .

[17] "Ethanol and the Local Community", by John Urbanchuk of AUS Consultants and Jeff Kapell of the SJH & Company, June 20, 2002 found at http://www.ncga.com/ethanol/pdfs/EthanolLocalCommunity.pdf .

Today, there are no ethanol plants in Montana. A number of smaller plants operated from 1980-1995. The first ethanol plant began in Ringling in 1980. That same plant ended all Montana ethanol production in 1995. All were small operations, were underfinanced or had inexperienced management. Fuel ethanol production technology has greatly improved since then and operations are successful in many small rural states. All proposed ethanol plants in Montana are sufficiently large to capture economies of scale. The greatest annual ethanol production in Montana was 4.95 million gallons in 1985 from five plants[18]. Today's proposed facilities would produce that much in a month.

Currently, there are several ethanol production plants proposed for locations in Montana. Two plants are on the 2-year Montana Department of Transportation short list for the Montana production incentives described above. One would be in Hardin and another in Great Falls. The keys to success for an ethanol plant in Montana include sufficient financing, sufficient grain inputs, effective management, strategic partners, affordable transportation of the ethanol to markets, and sufficient markets for plant co-products. There are two state level incentives that encourage ethanol production in Montana. One involves a reduction in the state motor fuels tax collected on ethanol blends at specially marked pumps and the other involves a 30-cent per gallon incentive to the ethanol producer using Montana agricultural products. Both incentives are subject to numerous limitations and restrictions[19].

Using economic figures from available ethanol case studies, a 50 MGY ethanol plant in Montana would create an estimated 40-50 permanent jobs, $3 million in annual additional income, $1 million in additional annual tax revenues and a one-time boost of up to $140 million to the local economy during plant construction[20]. These are conservative, low-end figures and do not include positive secondary effects from such a plant, including increased local business and local equipment purchases by the plant. All of the case studies viewed suggest that the jobs in such a plant would be high paying compared with the average Montana job, and that such a plant would buy some of its needed inputs locally. If a larger plant or more than one such plant was built in Montana, then these benefit numbers would increase accordingly.

Several companies have completed or are currently working on wheat-feedstock projects in Canada where the economics are somewhat better for wheat plants than in the U.S. For example, two smaller wheat gluten/ethanol/meat packing operations have come on-line in Canada in the past decade using older, less

[18] Montana Department of Revenue records of distributor and producer incentives paid.
[19] "Hydrogen, Wind, Biodiesel, and Ethanol: Alternative Energy Sources to Fuel Montana's Future?", EQC Study Report, Sept., 2004, page 44.
[20] Ethanol studies researched include, "Economic Impact of Ethanol Production Facilities" by ENERGETICS and the NEOS Corporation (June 1994), "Fuel Ethanol-A Technological Evolution", by NOVOZYMES and Brian and Brian International, (June 2004) and "Ethanol and the Local Community", by John Urbanchuk of AUS Consultants and Jeff Kapell of the SJH & Company, (June 20, 2002).

efficient (wheat gluten) conversion technology. They have been successful in part because they have successfully marketed numerous co-products including wheat gluten, packing plant waste, and digester sludge. Wheat in the U.S. is priced higher than Canadian wheat due to farm subsidy programs, and therefore is less economical to convert to ethanol[21].

Philip Madson, President of Katzen International, Inc. explains that the choice to build an ethanol plant is based upon feedstock price and availability, investment costs, thermal and electric energy costs, water availability and access to co-products markets. Co-products from ethanol plants include distillers dried grains with solubles, wet distillers grains, and condensed distillers solubles. Mr. Madson goes on to state that the choice to build an ethanol plant using wheat or corn feedstock is based primarily upon feedstock (starch) price and availability. However, there is the additional factor of increased investment in a wheat plant that is typically 5 to 10 percent more than for a corn plant with an identical business model. It is important to note that this premium investment for wheat is less than the capital cost variation among the different types of corn ethanol plants[22].

Philip Madson goes up to state that the two factors that dominate the competitive positions of ethanol plants in the U.S. are first, feedstock cost, and second, state financial support for the producers. Other matters such as feedstock differences and technological factors that influence investment and cost-of-production are of marginal significance in comparison. Therefore, if the cost per ton of starch from Montana grain sources can compete favorably with the cost per ton of starch from Midwest corn, then Montana ethanol plants will be competitive (assuming comparable state support). If, however, the cost per ton of Montana starch compares unfavorably to Midwest corn, alternative support structures must be considered. Mr. Madson also mentions that other ethanol plants around the world use a variety of feedstocks based on these factors. Thus, it seems clear that many factors would go into the decision of whether or not to build a wheat or corn plant in Montana[23].

Effects of Producing Ethanol in Montana on the Agricultural Sector

Ethanol production in Montana would provide an additional market for certain Montana grain growers, particularly corn, wheat and barley growers. It would also provide a market for grower's off-specification or low quality grain. This would help both large and small farms. The wheat and barley grown in Montana provide as many opportunities for ethanol production as corn. However, price will be a driving factor. The price and availability of corn in the Midwest has

[21] Larry Johnson, Delta-T Corporation, December 2004 communication.
[22] Letter to Ms. Shirley Ball from Philip W. Madson, President of Katzen International Inc., dated December 8, 2004 and a letter to Brian Spangler, Montana Department of Environmental Quality from Phillip W. Madson dated January 5, 2005.
[23] Ibid.

greatly contributed to the growth of the ethanol industry. Currently, corn prices are about $1.90 per bushel while feed barley is $2.50 and wheat is $3.00[24]. Barley and wheat crops are more common in Montana than corn. Such production would potentially increase the demand for local agricultural products and possibly raise crop prices, which could increase farmer's net income. For example, Montana farmers typically do not sell wheat in Washington State markets because of competition with local wheat crops, but the Puget Sound area might purchase millions of gallons of Montana-produced ethanol.

Increased ethanol production in-state could slightly shift the mix of crops on all Montana agricultural land towards corn, wheat and barley, if the markets for producing those crops for ethanol were great enough. Off-specification grain that is currently going to feed markets could be used instead for ethanol production. Off-specification grain often has a low amount of protein compared to premium grain which suits ethanol production well because low-protein means grain with higher levels of starch. Enough off-specification grain is produced each year in Montana (1 to 3 percent of Montana's total crop) to supply at least a 50 MGY ethanol plant if transportation costs were favorable. In 1985, Montana's lowest crop yield in 75 years, 1.5 percent of the total wheat crop would have produced about 56 million gallons of ethanol[25]. That does not mean that all distressed grain would go to ethanol production. The distillers grains that do go to ethanol production could still be used for animal feed after being processed for ethanol, thereby reducing or avoiding cost impacts in stock growers.

Next year's changes in the Conservation Reserve Program (CRP) could cause changes to be made with land use in Montana. Two million acres will be retired from the program in the next 3 years. This land may be put back into the CRP, but some of that land may go back into crop production. This change could be very compatible with an ethanol plant(s) operating in Montana, as more land might be available for growing the needed plant feedstock without displacing as much Montana-grown grain that is already committed to other markets.

The extent to which a Montana ethanol plant would raise crop prices statewide, if any, is unknown, although price increases in local regions of other states have been documented[26]. The greatest benefit to farmers selling their product to a Montana ethanol plant may be a decrease in the rail freight charges they have to pay. The charges to ship grain out of state are substantial, and any savings from not having to do so could accrue to farmers. In addition, ethanol plants can use distressed, low-quality (low protein) grain, thus providing markets for a product that would otherwise command a low feed price.

[24] Brent Poppe, Montana Department of Agriculture, personal communication.
[25] "Energy From Montana Crops and Residues", Montana Department of Natural Resources and Conservation, 1987.
[26] Nebraska Ethanol Commission, 2002.

Every new ethanol plant has an impact on local corn prices and corn movement. The extent depends upon location, distance from the plant, and crop season. Most studies project a 5-10 cent per bushel increase for corn, with a documented increase of about 25 cents per bushel in eastern South Dakota where ethanol production has outgrown local corn supplies. Wheat production facilities may produce increases similar to the study projections as documented by the small wheat-based ethanol plant in North Dakota[27].

The Dillon ethanol plant, when it was operating in the late 1980's, paid wheat producers 5 to 10 cents more per bushel over the price paid at the elevator. This increased price and lowered transportation costs to select farmers. The difference in price that was paid was similar to what the plant would have paid the elevator directly for handling and for transportation. In this case, the difference went to the farmer. The growers were able to gain the increased price and did not have to pay rail transportation costs. Any rise in price might be insignificant since wheat prices are typically determined on a national level. Thus, it is unclear whether Montana farmers would make more money for their crop by selling it to an ethanol plant. Impacts on Montana grain prices, if any, may be better estimated when the ethanol plant in Williston, North Dakota, begins production. It has contracted 200,000 bushels of Montana-grown grain at this time[28].

To be successful, ethanol production plants need to sell all their co-products, such as animal feed or high protein wheat gluten. These co-products could also generate value and income for Montana's agricultural sector. However, Montana does not have many feedlots, so this benefit may be insignificant in state and may increase costs of producing ethanol in Montana compared to other states. In order for an ethanol plant to be successful and command an acceptable rate-of-return on investment, Montana would need to have a sufficient market for the by-products of an ethanol plant.

Other Economic Effects from Producing Ethanol and Increasing Ethanol Use in Montana

Increased ethanol blend use in Montana would create other benefits that have not yet been discussed. Most of these benefits would be environmental in nature, and could extend beyond state borders. In some cases, the benefits are modest, but they are real. It is beyond the scope of this paper to estimate the monetary values of these benefits, but the benefits themselves are listed here and include the following:

[27] Larry Johnson, Delta-T, email from December 2, 2004.
[28] Dr. Jerry Bergman, Board member of the ethanol plant in Williston, ND. Personal communication, November, 2004.

- Ethanol is biodegradable. Using ethanol as a gasoline oxygenate rather than MTBE could reduce or stop the water contamination and associated remediation costs in Montana that can occur from MTBE.
- Ethanol blend gasoline produces lower emissions of carbon monoxide, unburned hydrocarbons, volatile organic compounds, and fine particulate exhaust products of conventional fuels[29].
- Ethanol can increase the U.S. domestic energy supply. It takes only 1 gallon of petroleum gasoline equivalent energy to produce 1.67 gallons of ethanol using today's technology[30].
- Producing ethanol fuel in the United States better ensures energy security, reduces the U.S. trade deficit, and reduces the need for securing Middle East oil.
- Increased air quality from cleaner burning fuel with ethanol provides the benefits of better air visibility, healthier ecosystems, and higher quality recreation.
- Ethanol may use materials that would typically go into the waste stream, thus reducing waste to make a valuable product. For example, ethanol production could assist in the disposal of paper mill waste sludge.
- Ethanol speeds up the gradual U.S. switch away from a fossil fuel economy by resulting in the use of less hydrocarbons from non-renewable resources. Using ethanol in all reformulated gasoline nationwide could contribute 1.6 billion gallons per year to the U.S. fuel supply[31].

Conclusion

The greater penetration of ethanol blend into Montana's gasoline market would produce insignificant benefits and costs on a state level in terms of major economic indicators. Benefits would be significant on a local level to select communities and farmers if an ethanol plant were built in Montana. These local benefits would include jobs, income, local tax revenue, secondary economic effects, and possibly higher prices to select farmers. The initial costs to the petroleum industry of switching to ethanol blend could be noticeable, although long-term industry costs would not be significant. The experience in other states shows that the long-term costs of switching to ethanol blend are eventually absorbed by the industry and are a part of the costs of doing business in a changing world. Gasoline consumers would experience no significant effects, and could see either a small rise or small fall in the gasoline prices they pay. There would be a benefit to the environment in the form of both improved air and water quality, and to Montanans that enjoy the environment.

[29] Argonne National Laboratory, GREET Model 1.6, 2003.
[30] This figure is from the USDA, June 2004, as reported in "Net Energy Balance of Ethanol Production", Fall 2004, A Publication of Ethanol Across America, page 6.
[31] The Clean Fuels and Electric Vehicles Report, Energy Futures Inc., Vol. 16, No. 3, September 2004.